

Taxation and Innovation

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Introduction

Knowledge is socially valuable and is of utmost importance for human development and growth. The production of knowledge – i.e., innovation – and the rights of access and use of knowledge are central to the knowledge economy. Hence the need to thoroughly consider the proper way to regulate knowledge and carefully design such public measures.

Innovation possesses characteristics of a public good due to its non-rivalrous and costly excludability features. Hence, private incentives to innovate are generally not aligned with social preferences and are considered lacking. Therefore, society should further encourage innovation. Several instruments can be, and are, used for that purpose: intellectual property rights (IPR), prizes, grants, research contracts, tax incentives (subsidies). In particular, tax incentives are increasingly advocated and widely used in the U.S. as well as in other countries.¹ Yet, a normative justification for the use of tax incentives is lacking.

The economic literature strictly separates analyses of IPR and tax incentives. The economic literature on IPR generally revolves around two issues. One is the optimal design of IPR, largely beginning with Arrow (1962). The other strand of the IPR literature, starting with Wright (1983), examines the relative desirability of cash transfers (e.g., prizes, grants, buyouts) and IPR mechanisms in regulating innovation, with a seemingly growing support for cash transfers.² The IPR literature focuses on efficiency in terms of asymmetric information and monopoly power, although some economists mention also distributive features of innovation-inducing mechanisms. However, the economic literature on IPR completely ignores tax incentives. A separate strand of economic literature studies tax incentives but not in any specific relationship with other innovation-inducing mechanisms – i.e., IPR and cash transfers. The focus of the tax incentives literature is on design of tax incentives and their effects and effectiveness in encouraging R&D or innovation in general.³

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¹ See, e.g., OECD, *Tax Incentives for Research and Development: Trends and Issues* (2007); Daniel J. Hemel & Lisa Larrimore Ouellette, *Beyond the Patent-Prizes Debate*, 92 *Texas L. Rev.* 303 (2013); Shaun P. Mahaffy, Note, *The Case for Tax: A Comparative Approach to Innovation Policy*, 123 *YALE L. J.* (2014); Xuan-Thao Nguyen and Jeffrey A. Maine, *The History of Intellectual Property Taxation: Promoting Innovation and Other Intellectual Property Goals?*, 64 *SMU L. Rev.* 795 (2011).

² See, e.g., Joseph Stiglitz, *Economic Foundations of Intellectual Property Rights*, 57 *Duke L.J.* 1693 (2008); Michael Kremer, *Patent Buyouts: A Mechanism for Encouraging Innovation*, 113 *Q.J. Econ.* 1137 (1998); Suzanne Scotchmer, *Innovation And Incentives* (2004). But see Weyl, E. Glen, and Jean Tirole, *Market power screens willingness-to-pay*, *Q.J. Econ.* (2012); Chari, Varadarajan V., Mikhail Golosov, and Aleh Tsyvinski, *Prizes and patents: Using market signals to provide incentives for innovations*, 147 *J. of Econ. Theory* 781 (2012).

³ See, e.g., G. Tassev, *Tax incentives for innovation: time to restructure the R&E tax credit*, *J. Technol Transfer* 605 (2007); Bronwyn Hall and John Van Reenen, *How Effective Are Fiscal Incentives for R&D? A Review of the Evidence*, 29 *Research Policy*, 462(2000); Nick Bloom, *Do R&D Tax Credits Work? Evidence from a Panel of Countries, 1979–1997*, 85 *J. PUB. ECON.* 1 (2002); Edwin Mansfield, *The R&D Tax Credit and other Technology policy issues*, *The American Economic Review* (1986); Klassen k., Pittman J., and Reed M., *A cross-national comparison of R&D expenditure decisions: Tax incentives and financial constraints*, 21 *Contemporary Account Research*, 639(2004).

Legal scholars largely followed the economic literature. Recently, a few legal scholars try to incorporate the tax incentives mechanism into the discussion of IPR or cash transfers. These legal studies differ in their focus from the economic literature and offer different frameworks of analysis aiming at various variables, such as liquidity constraints, non-marketable innovations, risk, etc. Yet, legal scholars take existing innovation-inducing instruments as they are and do not allow for their potential unconstrained redesign, and hence their analyses are lacking.

This article offers a new theoretical framework for the evaluation of tax incentives for innovation and applies it to commonly used tax instruments. The theory is strongly related to both the tax expenditure literature and the emerging literature on instruments' redesign. The general thesis is that in principle, tax incentives are different from cash transfers (e.g., grants, prizes) only institutionally, although in practice their common design also differs. Once redesign of tax incentives and cash transfers is allowed, any tax support for R&D can be restated in cash transfer terms or any prize can be restated in tax incentive terms. The equivalence in designing tax incentives and cash transfers, which is also reminiscent of the (the good part of the) tax expenditure literature, triggers an institutional analysis that we offer as a theoretical framework. The choice between tax incentives and cash transfers should be based on comparative (dis)advantages of institutions. Specifically, if cash transfers are preferable to IPR, the choice between cash programs and tax incentives should concentrate on the institutional capacity to implement such transfers; the capability of the tax authority should be compared to that of a specific department (by subject-matter) such as defense, environment, agriculture, etc.

The theoretical framework we offer is not only more general and accurate than previous approaches, but also allows for various new insights in the analysis of innovation-inducing mechanisms. First, it partitions the analysis into two analytically separated stages. In the first, IPR and cash transfers (of various designs) should be compared and evaluated. In the second stage, if cash transfers transpire superior, an institutional question emerges: which government institution should be used to implement cash transfers. In particular, in which circumstances the tax authority is a superior implementing institution, and then cash transfers better be designed in a tax incentives form.

Second, our framework advances an expansion of the economic analysis of IPR versus cash transfers. The analysis so far has focused on comparing IPR with common mechanisms of cash transfers such as grants and prizes. These cash transfers are commonly designed in a lump-sum fashion and assessed by expected future outcomes, rather than by actual outcomes. For example, a prize for innovation is calculated by the social welfare or utility or willingness-to-pay which is expected to be generated by innovation. Obviously, it is difficult for a government agency to produce that necessary information, and hence prizes are complex and inaccurate.⁴ The advantage of IPR is that it links the innovator's benefit to actual market outcomes, and hence utilizes the information she retains about her own innovation. Unlike common cash transfers, an IPR regime harnesses the information possessed by innovators, which is considered superior –

⁴ Therefore, advocates of cash transfers attempt to design information-revealing mechanisms. See, e.g., Kremer (1998).

i.e., cheaper and more accurate – to that of government. Thus, the informational advantage of IPR may outweigh its principal drawback of larger deadweight loss.

However, the common pattern of cash transfers is not natural in any necessary manner; it can be modified. Cash transfers can be redesigned similarly to tax instruments. Cash transfers can be tailored to market outcomes. They can be contingent on investment in innovation or on sales, revenues, or profits. Allowing for a redesign of cash transfers changes the center of gravity in economic analyses. If cash transfers can be designed over market variables (e.g., quantities and prices), they can be used to extract private information from market participants as well. IPR regimes are, then, no longer superior on an informational account.

Section III investigates that choice between IPR regimes and market-based cash transfers. We examine first a free access regime, and hence competitive market, in which a sales tax is imposed; the sales tax revenue is transferred in its whole to the innovator who initiated the market by her innovation. We show that a sales tax that provides the innovator with a subsidy equal to monopoly profits under an IPR regime will never generate a larger deadweight loss, and is hence weakly superior on this account. We then generalize this setup to a prize which is determined by outcome of a competitive market, but is financed through general taxation, which is decisively superior to an IPR regime. Accordingly, cash transfers can solicit the same kind of information as IPR regimes, but are preferable on efficiency grounds. Only to the extent that implementation of IPR is cheaper, may it be preferable to cash transfers. That is, rather than focusing on the tradeoff between asymmetric information and monopoly deadweight loss, as done by economists, we argue that the (potential) tradeoff is between monopoly deadweight loss and differing implementation costs.

The third contribution advanced by our framework, which is explored in Section IV, is the application of an institutional theory, as suggested by Weisbach and Nussim (2004), to the choice between cash transfers and tax incentives. A few legal scholars suggested several features that differentiate innovation-inducing mechanisms (e.g., timing, risk), and that, hence, should dictate the choice between cash transfers and tax incentives. However, since cash transfer as well as tax incentive can be redesigned equivalently, we show that all the suggested features are redundant and cannot assist us in choosing between cash and tax. Instead, we argue, the implementing institutions make the difference. Specialized agencies design and implement innovation-inducing instruments more accurately, and hence are better suited for the job. We explain how the institutional theory applies to innovation-inducing mechanisms, and then examine its implications using various commonly used tax and non-tax (cash) instruments. Our general conclusion is that the tax authority is largely not suited for designing and implementing innovation-inducing mechanisms, and hence tax incentives for R&D and the like should be repealed and replaced by other cash transfer programs that are managed by specialized government agencies.

We proceed as follows. Section I shortly presents innovation-inducing mechanisms: IPR, cash transfers, and tax incentives. Section II summarizes the economic literature (theory and

empirics) and presents the legal viewpoint on the choice of innovation-inducing instruments. Section III uses simple microeconomics to compare (competitive) market-based prizes, which are financed by sales tax, to the monopoly outcome. It shows that the deadweight loss under the former option is never larger, and becomes superior once financed by general taxes. Section IV describes first the potential equivalent design of cash transfers and tax incentives. Then, it presents an institutional theory, originally suggested by Weisbach and Nussim (2004), for the choice between cash transfers and tax incentives. It explains how the institutional theory fits the normative question, and then applies it to actual instances of grants, prizes, and tax benefits.